CONGESTION CONTROL ON A CELLULAR FREQUENCY PROVIDING BROADCAST SERVICES

FIELD

[0001] The present invention relates to congestion control on a cellular frequency providing broadcast services. More specifically, the present invention exemplarily relates to measures (including methods, apparatuses and computer program products) for realizing congestion control on a cellular frequency providing broadcast services.

BACKGROUND

[0002] The present specification generally relates to congestion of a cell on a multimedia broadcast and multicast service (MBMS) carrier and the control thereof. MBMS aims to provide an efficient mode of delivery for both broadcast and multicast services over the core network in Long Term Evolution (LTE) systems.

[0003] MBMS in LTE Rel-10 systems is only optimized for single-carrier deployments. This means that for terminals in RRC_Idle state, cell reselection rules implement no exceptions for the terminals' possible MBMS reception from a certain frequency or for possible interest in what MBMS services are available on another frequency. Further, for terminals in RRC_Connected state, the network has no knowledge of the terminals' possible MBMS reception from a certain frequency or possible interest in what MBMS services are available on another frequency (so that inter-frequency handover decisions could be made accordingly). As a result, an interruption of terminals' possible MBMS reception from a certain frequency may occur on certain incidents like cell reselection.

[0004] The ongoing Rel-11 MBMS work item [RP-120258] is set to overcome such inconvenience. As part of this work, the following agreements were minuted:

[0005] A new system information block (SIB) is to be used for transmission of (MBMS) service area identity (SAI) information. The new SIB acquisition is to be performed similar to system information block type 13 (SIB13) acquisition procedure. In SIBs, system information (SI) is broadcasted. SI consists of cell- and network-specific parameters which are broadcast to allow terminals like user equipment (UE) to connect successfully to the network. SI is structured into SIBs, each of which contains a set of functionally-related parameters. SIB13 is the existing system-information block dedicated to MBMS, i.e. SIB13 contains necessary information for the UE to start receiving the MBMS broadcast.

[0006] When MBMS SAIs are not provided in SI, the UE only prioritizes a frequency where SIB13 is provided, that is, where SIB13 is scheduled in SIB1 (which contains parameters needed to determine if a cell is suitable for cell selection as well as information about the time domain scheduling of the other SIBs). Whether SIB13 is scheduled in SIB1 has to be verified as part of the suitability check before camping on the considered cell. This UE behavior applies to Rel-9/10/11 UEs.

[0007] In the RAN2 discussion a concern with the above specification change is the possible concentration of load from unicast-connection establishments onto the cells of a frequency carrier providing MBMS services.

[0008] Thereby, a control of congestion and admission are discussed. In particular, a network controlled prioritization of MBMS carrier in case of RRC_Idle mode cell selection, and the question, where to camp when cell on MBMS carrier is congested, and whether an additional indicator for a congested cell is necessary, is discussed.

[0009] In the course of the discussion, possible solutions proposed include, for example:

[0010] Network indicates whether a frequency may be prioritized for MBMS (if a frequency is not indicated as being prioritizable, a UE may receive MBMS on that frequency but may not camp on it).

[0011] A congested MBMS cell may broadcast an indication that UEs prioritizing MBMS over unicast must not establish a connection for Mobile-Originated (MO) data.

[0012] UE may prioritize MBMS bearers. Network indicates if it is congested, so that the UE knows that e.g. GBR bearers might not be established.

[0013] After discussion of the issues whether a necessity of introducing an additional mechanism to avoid unequal camping load distribution resulted by MBMS prioritization of LTE Rel-11+ UEs exists, and the justification thereof considering that LTE Rel-9/10 UEs are allowed to prioritize the frequency unconditionally and that the problematic basic MBMS UEs would most likely be based on LTE Rel-9/10 (in this respect, more advanced UEs are UEs that are able to receive MBMS while camping on a non-MBMS carrier), main points to be avoided in case the MBMS carrier is congested (and that can not be achieved using existing means) are identified as being dedicated bearers and/or guaranteed bit rate (GBR) bearers (level 1 of avoidance), and connection establishment, signaling and default bearers (level 2 of avoidance).

[0014] As a result of the discussion, it is agreed that it is to be relied on existing mechanisms, e.g. allowing MBMS-based prioritization and use of Access-Class Barring (ACB), rejection of RRC Connection Requests, etc., if needed.

[0015] That is, as a solution of the above identified problem, relying on existing mechanisms, e.g. allowing MBMS-based prioritization and use of ACB, rejection of RRC Connection Request, etc., if needed, is proposed.

[0016] Hence, the problem arises that the possible concentration of load from unicast-connection establishments onto the cells of a frequency carrier providing MBMS services and the thus induced congestion of cells of a frequency carrier providing MBMS services is merely roughly solved.

[0017] Hence, there is a need to provide for congestion control on a cellular frequency providing broadcast services.

SUMMARY

[0018] Various exemplary embodiments of the present invention aim at addressing at least part of the above issues and/or problems and drawbacks.

[0019] Various aspects of exemplary embodiments of the present invention are set out in the appended claims.

[0020] According to an exemplary aspect of the present invention, there is provided a method comprising removing an entry of a first system information block from a list included in a second system information block to be broadcasted, said first system information block comprising information related to multimedia broadcast and multicast services, said list comprising information related to broadcasted system information elements, prohibiting modification of an information tag included in said second system information